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CANCELLED
NATIONAL STANDARDS COMMISSION

NATIONAL MEASUREMENT (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

CERTIFICATE OF APPROVAL No 6/14D/9

This is to certify that an approval for use for trade has been granted in respect of the pattern and variants of the

Inflo Model RF 4/2 Belt Conveyor Weigher

submitted by Control Systems International Pty Ltd
(formerly Material Control Systems Pty Ltd)
Unit A, 28-32 Egerton Road
Silverwater NSW 2141.

CONDITIONS OF APPROVAL

General:

The approval is subject to continuing review.

Instruments purporting to comply with this approval shall be marked NSC No 6/14D/9.

This approval may be withdrawn if instruments are constructed other than in accordance with the drawings and specifications lodged with the Commission.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0.

Special:

The submitter shall notify the Commission of each instrument to be submitted to State or Territorial Weights and Measures Authorities for verification. Inspectors should not verify any instrument purporting to comply with this approval until advised in writing by the Commission.

Means shall be provided to ensure that the conveyor cannot move in the reverse direction.

Minimum delivery (Min) is:

- For a Class 1 instrument, 2000 totaliser increments.
- For a Class 2 instrument, 1000 totaliser increments.

Instruments are to be recalibrated at periods not exceeding:

- For a Class 1 instrument, six months.
- For a Class 2 instrument, twelve months.

Signed

Executive Director

Descriptive Advice

Pattern: approved 28/7/76

- Inflo model RF 4/2 Class 1 belt conveyor weigher with a maximum flow rate of 20 000 t/h.

Variants: approved 28/7/76

1. With the totaliser and flow rate indicator remote from the headwork.
2. With additional resettable totalisers, marked NOT IN USE FOR TRADE.

Variant: approved 4/4/77

3. With an electronic totaliser.

Variant: approved 8/9/80

4. The pattern and variants 1 to 3 as Class 2 belt conveyor weighers.

Technical Schedule No 6/14D/9 describes the pattern and variants 1 to 4.

Variant: approved 2/5/83

5. With a non-resettable eight-digit electronic totaliser.

Technical Schedule No 6/14D/9 Variation No 1 describes variant 5.

Variant: approved 28/9/87

6. With a model MCS 9600 microprocessor-based main logic unit.

Technical Schedule No 6/14D/9 Variation No 2 describes variant 6.

Filing Advice

Certificate of Approval No 6/14D/9 dated 19/5/83 is superseded by this Certificate and may be destroyed. The Test Procedure given in Technical Schedule No 6/14D/9 dated 19/9/80 is replaced by the Test Procedure included herein.

The documentation for this approval now comprises:

- Certificate of Approval No 6/14D/9 dated 5/1/88
- Technical Schedule No 6/14D/9 dated 19/9/80
- Technical Schedule No 6/14D/9 Variation No 1 dated 19/5/83
- Technical Schedule No 6/14D/9 Variation No 2 dated 5/1/88
- Test Procedure No 6/14D/9 dated 5/1/88
- Figures 1 to 8 dated 15/2/77
- Figures 9 and 10 dated 19/5/77
- Figure 11 dated 19/5/83
- Figure 12 dated 5/1/88



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 6/14D/9

Pattern: Inflo Belt Weigher Model RF 4/2

Submitter: Motherwell Inflo Pty Ltd,
42A Meta Street,
Caringbah, New South Wales, 2229.

1. Description of Pattern

The pattern (Figures 1, 2 and 3) is a Class 1 belt conveyor weigher of maximum flow rate (Q_{Max}) up to 20 000 t.h⁻¹, maximum belt speed (V) up to 6 m.s⁻¹, maximum weigh length (L) up to 12 m, and maximum capacity per metre of the weighing unit up to 1 t. It comprises a headwork (Figures 2 and 3), a basework which supports the conveyor belt on idler rollers (Figures 1 and 4) and a pulse transmitter (Figure 5).

The conveyor is supported on idler rollers mounted on a load receptor which is suspended from two main levers by links fitted with ball bearings at each end (Figures 1 to 4). A link fitted with ball bearings connects the two main levers together and a pullrod connects the basework to the headwork. A counterbalance weight may be connected to one main lever. The load receptor is restrained from swinging by diagonally and laterally connected chains.

The tail drum, or a roller on the inner surface of the return conveyor belt, drives the pulse transmitter, providing not less than 10 pulses to the headwork for each weigh length of belt travel (Figure 5).

The headwork comprises the "weigh-box" and computing unit (Figures 2 and 3).

Contained in the weigh-box are one or more flexure-plate-mounted force-reduction levers which reduce the pullrod force applied to the taut-wire resistant mechanism to between 30 and 90 N. The resistant mechanism is a wire which oscillates at a frequency proportional to the load applied through the force-reduction levers from the load receptor. Electro-magnets excite the wire into oscillation and its frequency is detected.

In the computing unit the frequency of the wire is compared to a reference frequency and the difference, that is, the change of frequency with load, is electrically processed with the signal from the pulse transmitter to produce digital pulses which are counted by an electro-mechanical non-resettable totaliser as mass (Figure 6).

Two sets of switches are provided on the front of the computing unit, one set for calibration adjustments, the other set for adjusting zero.

A multiply-by-10 switch which is provided for test purposes inhibits the totaliser and permits totalising in 1/10 increments on a separate totaliser which is marked NOT IN USE FOR TRADE.

1.1 Sealing

1. The cover on the metal enclosure containing the breakdown levers and the wire resistant, and the access panel to the enclosure, are sealed by passing a wire through two bolts on opposite sides of the enclosure and two studs on opposite sides of the access panel and terminating the end of the wire beneath a lead-plug stamping seal.
2. A cover which is sealed in position prevents access to the calibration adjustment switches, control switches and test points on the computer units (Figure 7).
3. The cable between the computer unit and the non-resettable totaliser is sealed to the computer and to the totaliser (Figures 7 and 8).

1.2 Marking

Instruments shall be clearly and permanently marked on one or more permanently attached nameplates with the following information:

Accuracy class	
Manufacturer's name or mark	
Serial number	
NSC approval number	NSC No 6/14D/9
Maximum flow rate	Q max*
Minimum delivery	Min*
Scale interval of totaliser	dt*
Belt speed	V ^d*
Maximum capacity of the weighing unit	Max*
Weigh length	L*

* These markings are repeated adjacent to each totaliser and flow-rate indicator.

2. Description of Variants

1. The totaliser and flow-rate indicator being remote from the headwork.³
2. Additional resettable totalisers; the totalisers are marked NOT IN USE FOR TRADE.
3. An electronic totaliser which indicates mass by means of six seven-bar digital indicators (Figure 9). A push-button is provided for each of the following functions:
 - . marked TEST, illuminates all the segments of each seven-bar indicator (all eights);
 - . marked HOLD, allows the operator to freeze the indication while the instrument continues to operate. Release of the button allows the display to catch up and display the totalised quantity;
 - . marked READ, provides battery power to the indicator so that the operator can take a reading in the case of power failure.

The indicator will remain blank if the supply is interrupted for a lengthy period (300 hours). An indicator-reset button which is inside the sealed case of the instrument, and which is only accessible by breaking the Weights and Measures seal, must be pressed to regain indication after restoration of power. Pressing this reset button will re-apply power to the indicator, which will restart with a zero indication.

The cover is retained on the indicator by a lead-and-wire seal as the instrument is too fragile for a plug seal (Figure 10).

4. The instrument as a Class 2 belt conveyor weigher.

Satisfactory operation of an installation having the indicator remote from the conveyor will depend on the operator being able to check that the overall system is functioning in a manner appropriate to the load conditions at any time. Any doubtful installations should be referred to the National Standards Commission.

3. Test Procedures

1. Accuracy Requirement

For Class 1 instrument: Within a flow-rate range of 100% to 20% of full flow rate the maximum permissible error at initial verification is $-0,5\%$ and the service tolerance is $\pm 1,0\%$.

For Class 2 Instrument: Within a flow-rate range of 100% to 20% of full flow rate the maximum permissible error at initial verification is $\pm 1\%$ and the service tolerance is $-2,0\%$.

2. Zero Test

When the instrument is operated at no load for a period equivalent to the minimum delivery at 20% flow rate or the time for one complete circuit of the belt, whichever is the greater, the totaliser indication shall not, either during or at the end of the test, increase or decrease by more than two scale intervals.

The test should either commence from the moment when the indication changes or alternatively the period of the test should be extended to the period necessary to deliver 1,5 times the minimum delivery at 20% flow rate.

3. Load Test

After the instrument has been adjusted to zero at no load, the maximum error positive or negative, when tested with a "live load" equal to the minimum delivery, shall not be more than $0,5\%$ at initial verification and $1,0\%$ in service for Class 1 instruments and shall not be more than $1,0\%$ at initial verification and $2,0\%$ in service for Class 2 instruments*.

Not less than three tests should be done at each of the following flow rates:

100%, 80%, 50% and 20% of Q Max.

**The checkweigher should be an instrument which has been accurately calibrated within $\pm 0,1\%$ at the test load.



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 6/14D/9

VARIATION No 1

Pattern: Inflo Model RF 4/2 Belt Conveyor Weigher

Submitter: Material Control Systems Pty Ltd
26 Banksia Road
CARINGBAH, NEW SOUTH WALES, 2229

1. Description of Variant 5

1.1 Totaliser

With a non-resettable electronic totaliser which indicates mass by means of 8 seven-bar digital indicators. A push-button is provided for each of the following functions (Figure 11):

- . marked TEST, illuminates all the segments of each seven-bar indicator (all eights);
- . marked HOLD, allows the operator to hold the indication while the instrument continues to operate. Releasing the button allows the display to catch up and display the totalised quantity;
- . marked READ, provides battery power to the indicator so that the operator can take a reading in the case of power failure.

If the supply is interrupted for a lengthy period (50 hours) the indicator will remain blank even after power is restored. An indicator-reset button which is inside the case of the instrument, and which is only accessible by breaking the Weights and Measures seal, must be pressed to regain indication (beginning with a zero indication) after restoration of power.

1.2 Sealing and Provision for Verification

The cover is retained on the indicator by two screws through which a lead and wire seal can be fitted at the discretion of the user. As the indicator is too fragile for a plug seal, a verification mark may be attached on a destructible adhesive label, the lead seal (if fitted) or the verification mark provision on the main frame of the instrument. The cover of the instrument is as shown in Figure 10 with the exception that the fuses are exposed.



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TECHNICAL SCHEDULE No 6/14D/9

VARIATION No 2

Pattern: Inflo Model RF 4/2 Belt Conveyor Weigher

Submittor: Control Systems International Pty Ltd
Unit A, 28-32 Egerton Road
Silverwater NSW 2141

1. Description of Variant 6

With a model MCS 9600 microprocessor-based main logic unit (Figure 12).

The unit receives input from the tachometer and the weight sensor, and provides output to a non-resettable totaliser and a flow rate indicator, together with any additional auxiliary or peripheral devices.

1.1 Operation

The unit is programmable via a keyboard on its front panel, however this function is disabled in normal operation by an internal switch.

The unit is provided with an automatic zero setting feature, whereby the unloaded belt mass may be zeroed if the mode switch is set to AUTO ZERO, and the AUTO ZERO button is pressed. The period over which this zeroing occurs is programmable (ID 32), and must be equivalent to an integral number of belt lengths.

The functions of the mode selection switch are:

- NORMAL - the instrument is in normal weighing mode.
- MODE A - display of measured and calculated values, for installation and maintenance use.
- MODE B - access to programmable data. In normal use, alteration is disabled by an internal switch.
- AUTO ZERO - allows automatic zeroing when the AUTO ZERO button is pressed.

A segment check is initiated by pressing the DISPLAY CHECK button.

The displays (when in NORMAL mode) indicate the totalised load (resettable), flow rate, HI and LO limits of the flow rate, and failure of the microprocessor unit, resonator (weight input) or tachometer input. The TEST indication illuminates when either mode A or B is selected.

1.2 Totaliser

Pressing the the TOTAL RESET button will reset the integral totalised load indicator to zero.

Note: In addition, a non-resettable totaliser is provided.



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TEST PROCEDURE No 6/14D/9

Note: This Test Procedure replaces the Tests given in Technical Schedule No 6/14D/9 dated 19/9/80.

Instruments should be tested in accordance with the Commission's Pattern Approval Manual (Design Manual) No 9 for belt conveyors.

Material Tests

Zero Error

The instrument shall be operated at no load for a period of time equal to, or greater than that required to deliver the minimum totalised load at the minimum flow rate. The duration of the test shall be equivalent to one or more complete revolutions of the belt.

The difference in the totaliser indication at the beginning and at the completion of the above test shall not be greater than 2 scale intervals.

If the totaliser indication varies by more than the abovementioned tolerance during the test period, then the minimum totalised load shall be recalculated to accommodate this variation in the following manner:

Minimum Totalised Load:

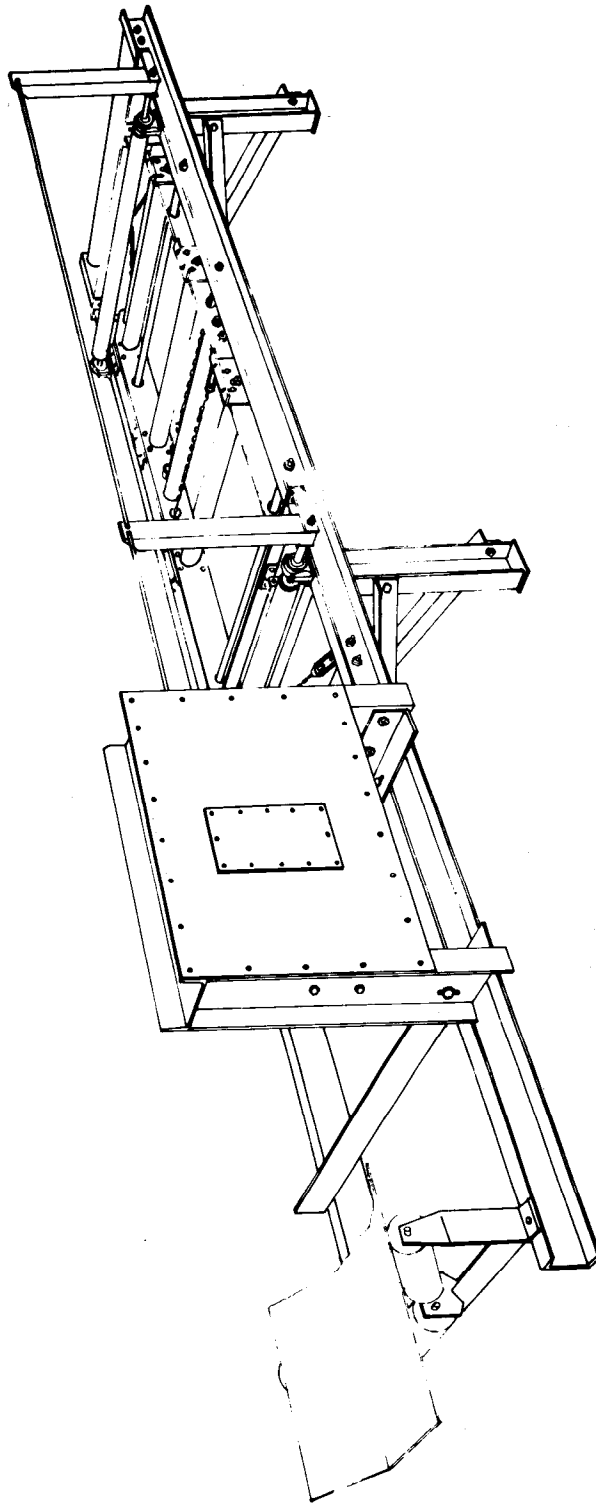
Class 1 Instruments - Digital indication = 2 000 x |maximum variation from zero|

Class 2 Instruments - Digital indication = 1 000 x |maximum variation from zero|

For the purpose of testing the above, the zero variation shall be recorded over at least two belt revolutions to obtain assurance that the variations observed are repeatable. For subsequent tests (i.e. between load tests) the zero variation need only be observed over one belt revolution.

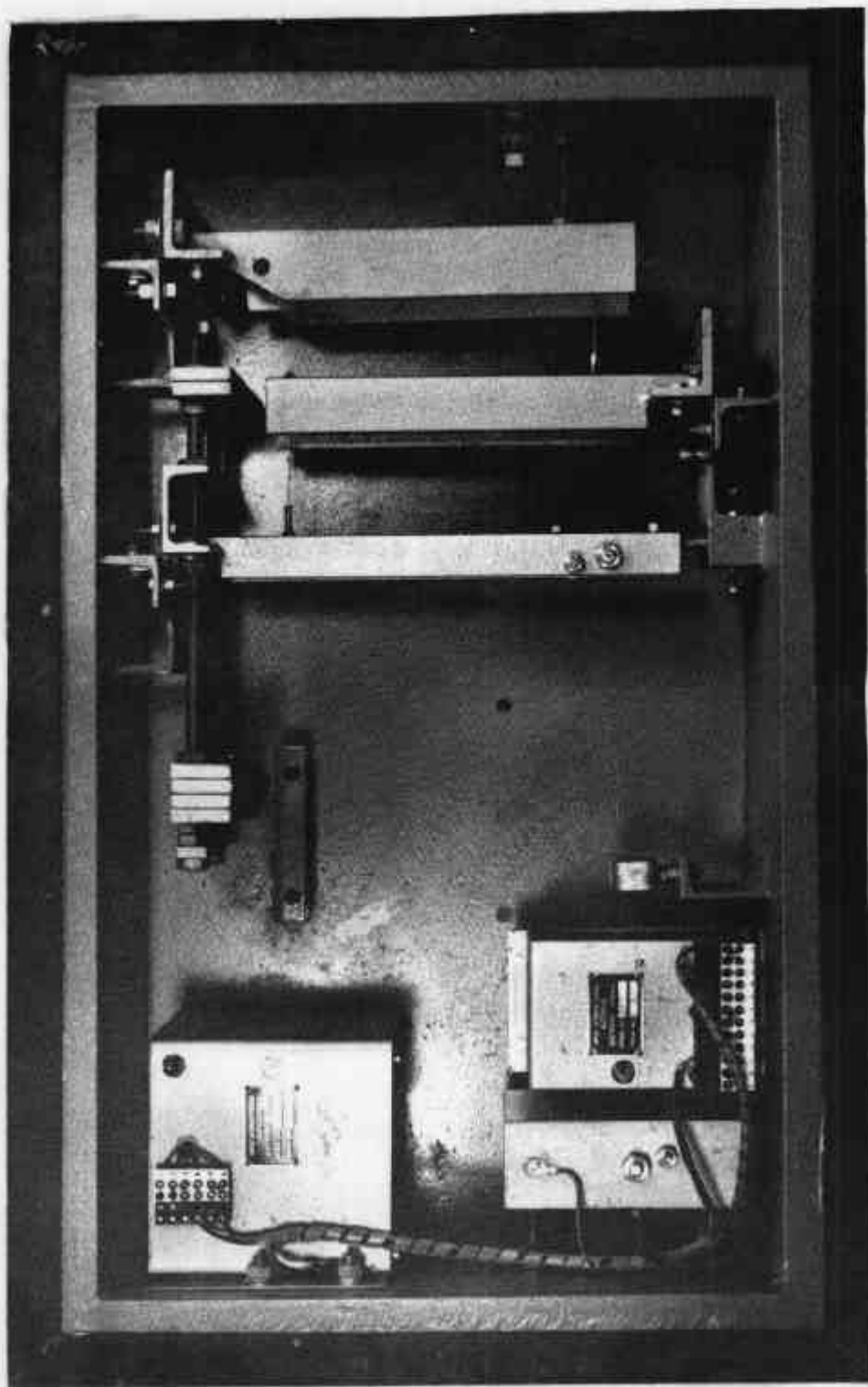
This minimum totalised load shall be marked on the instrument with the other mandatory markings.

FIGURE 6/14D/9 - 1



Inflo Belt Weigher

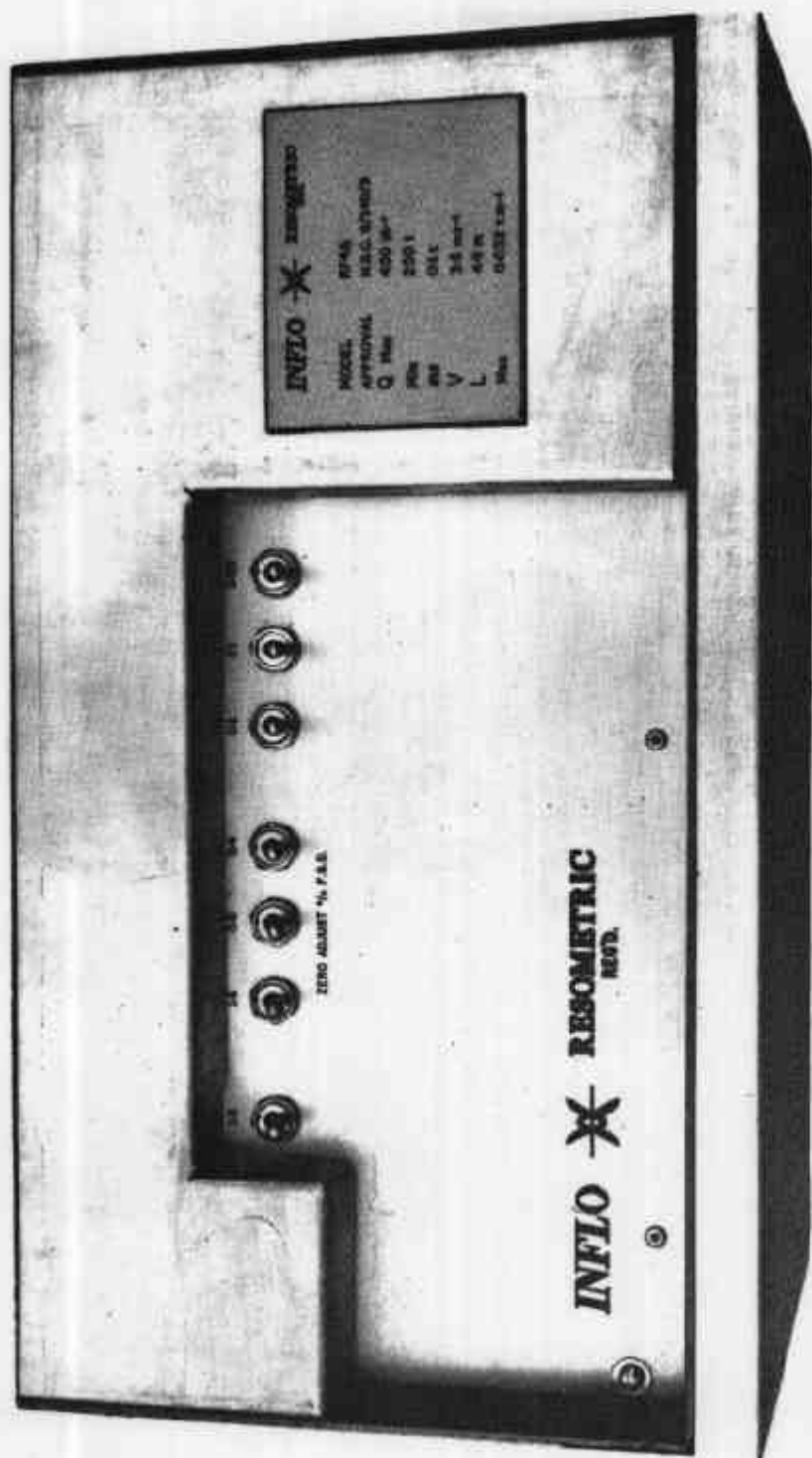
FIGURE 6/14D/9 - 2



Weigh-box — Cover Removed

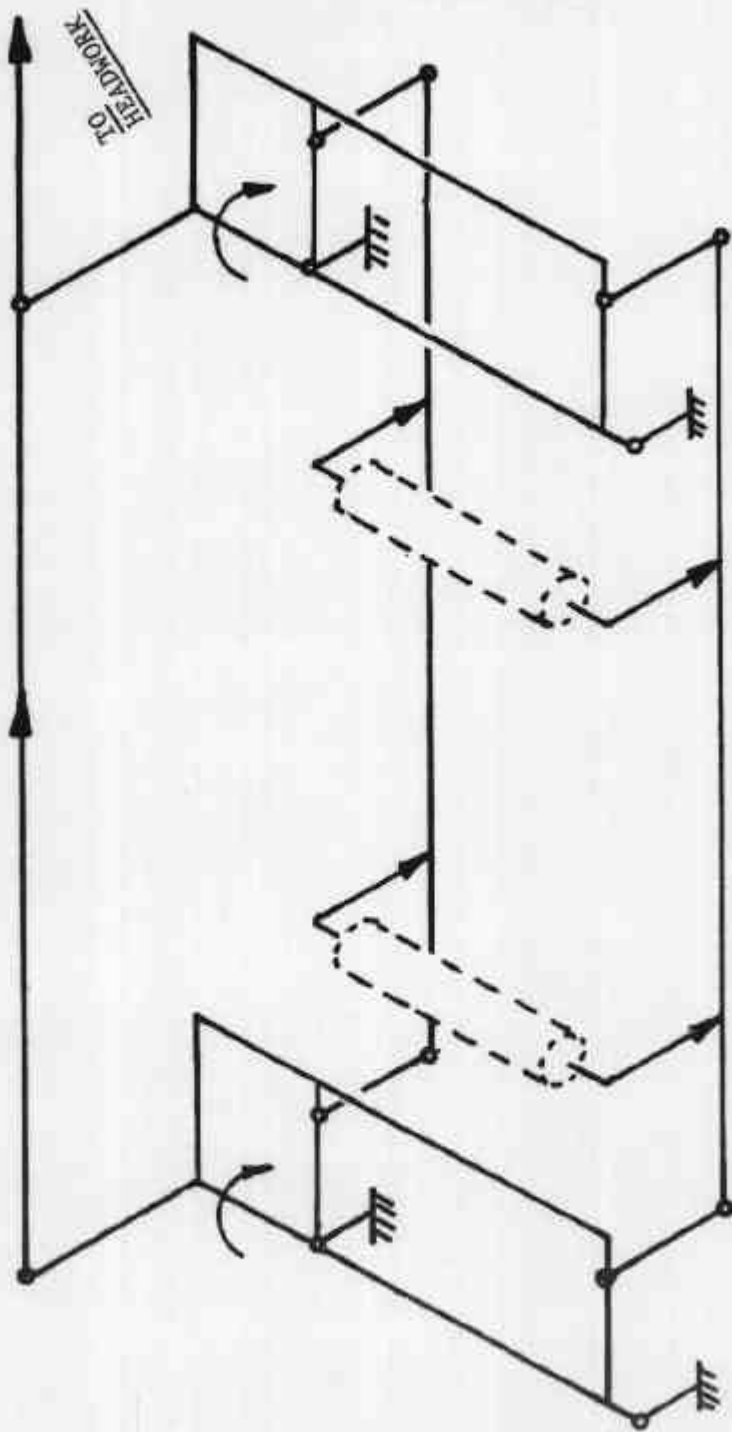
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FIGURE 6/14D/9 - 3



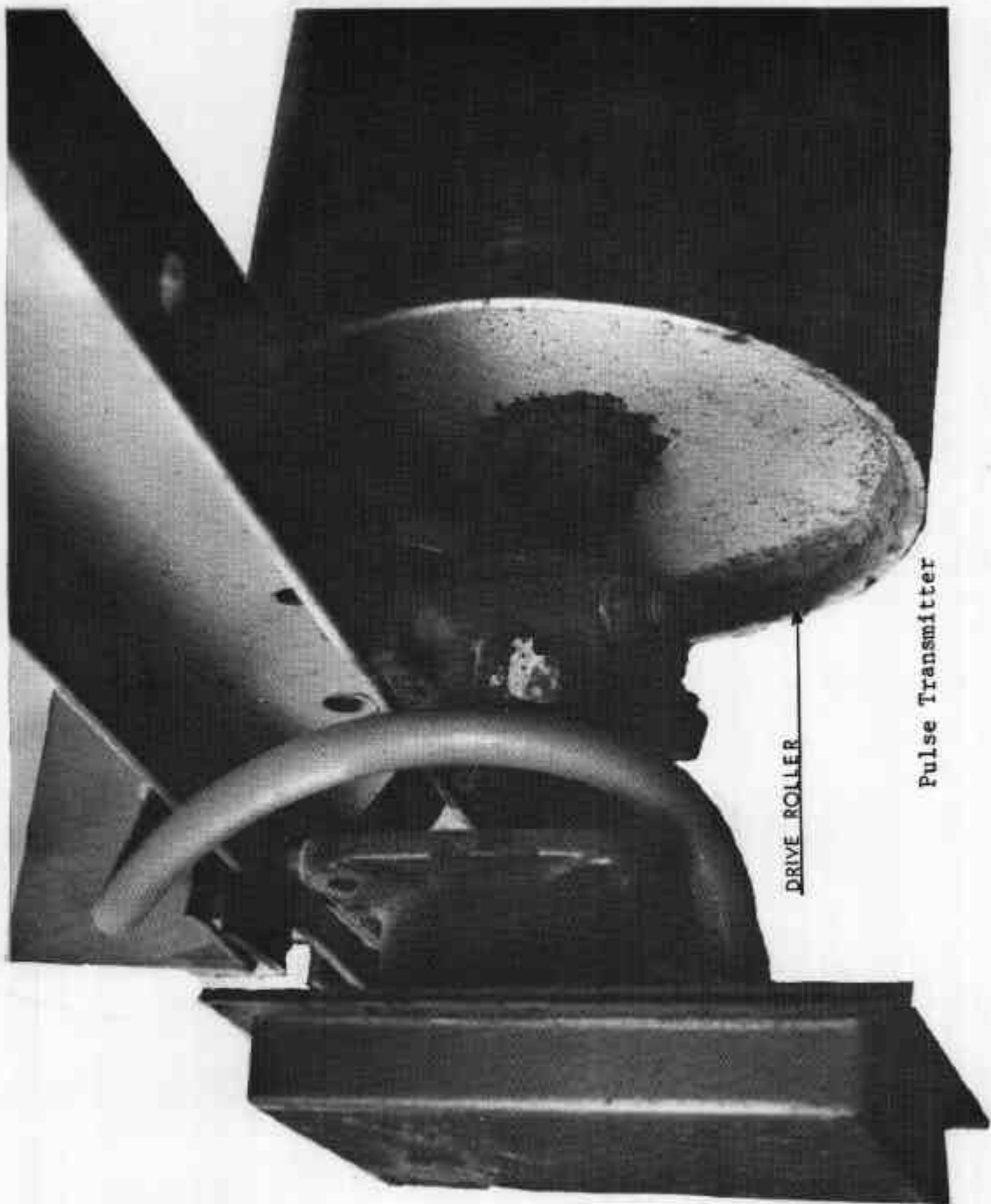
Computer Unit

FIGURE 6/14D/9 - 4



Basework — Schematic Diagram

FIGURE 6/14D/9 - 5

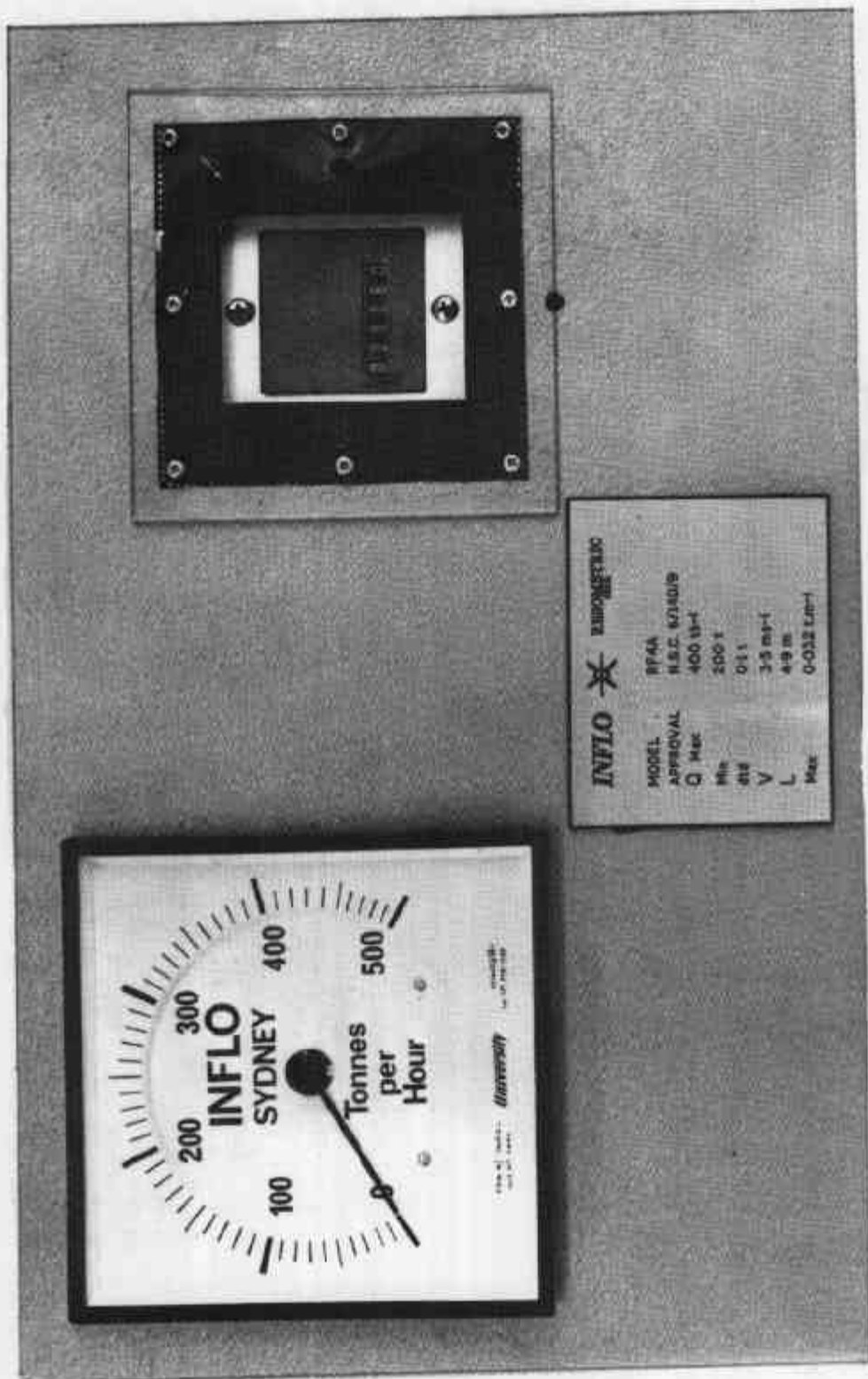


DRIVE ROLLER

Pulse Transmitter

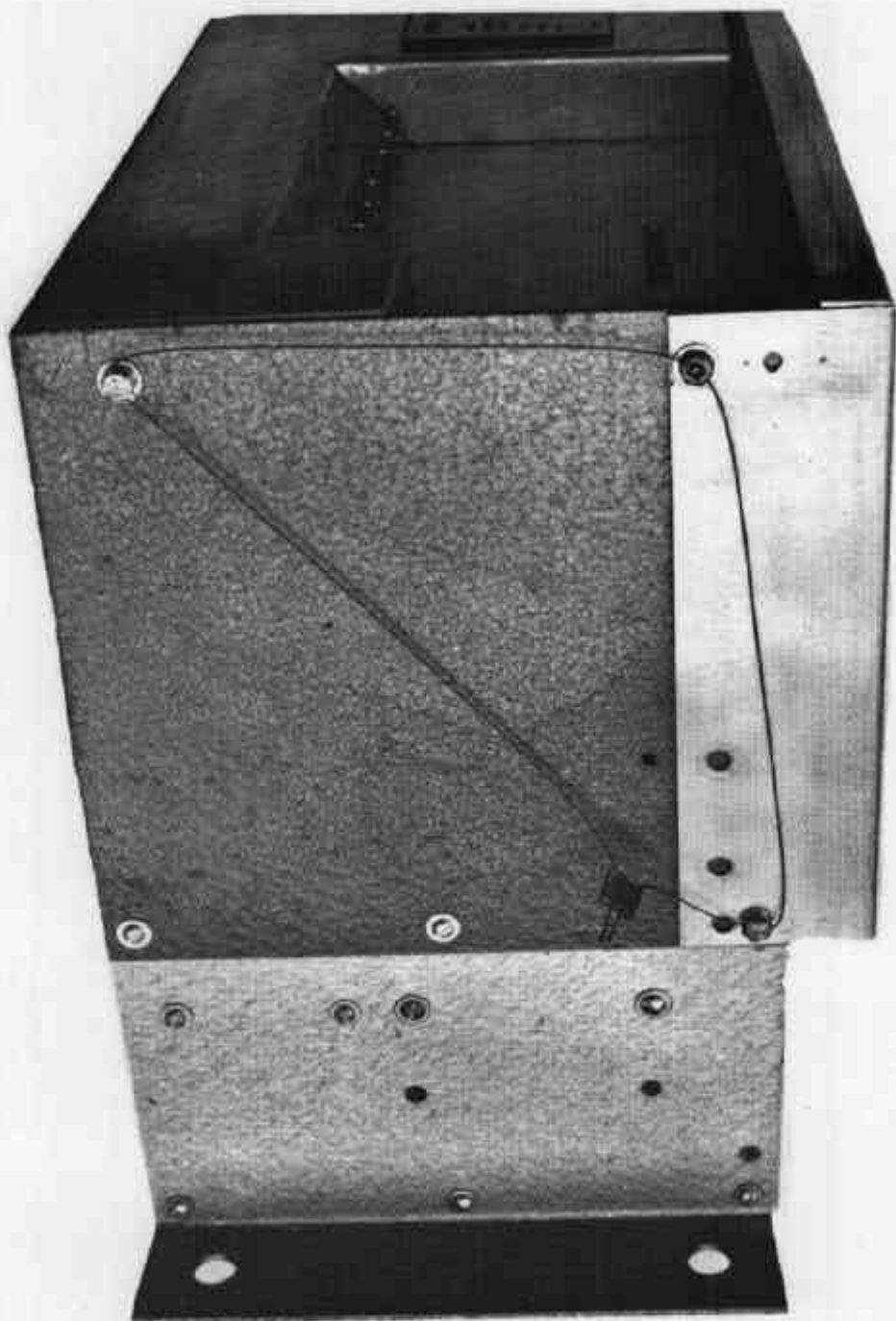
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FIGURE 6/14D/9 - 6



Flow-rate Indicator and Non-resettable Totalizer

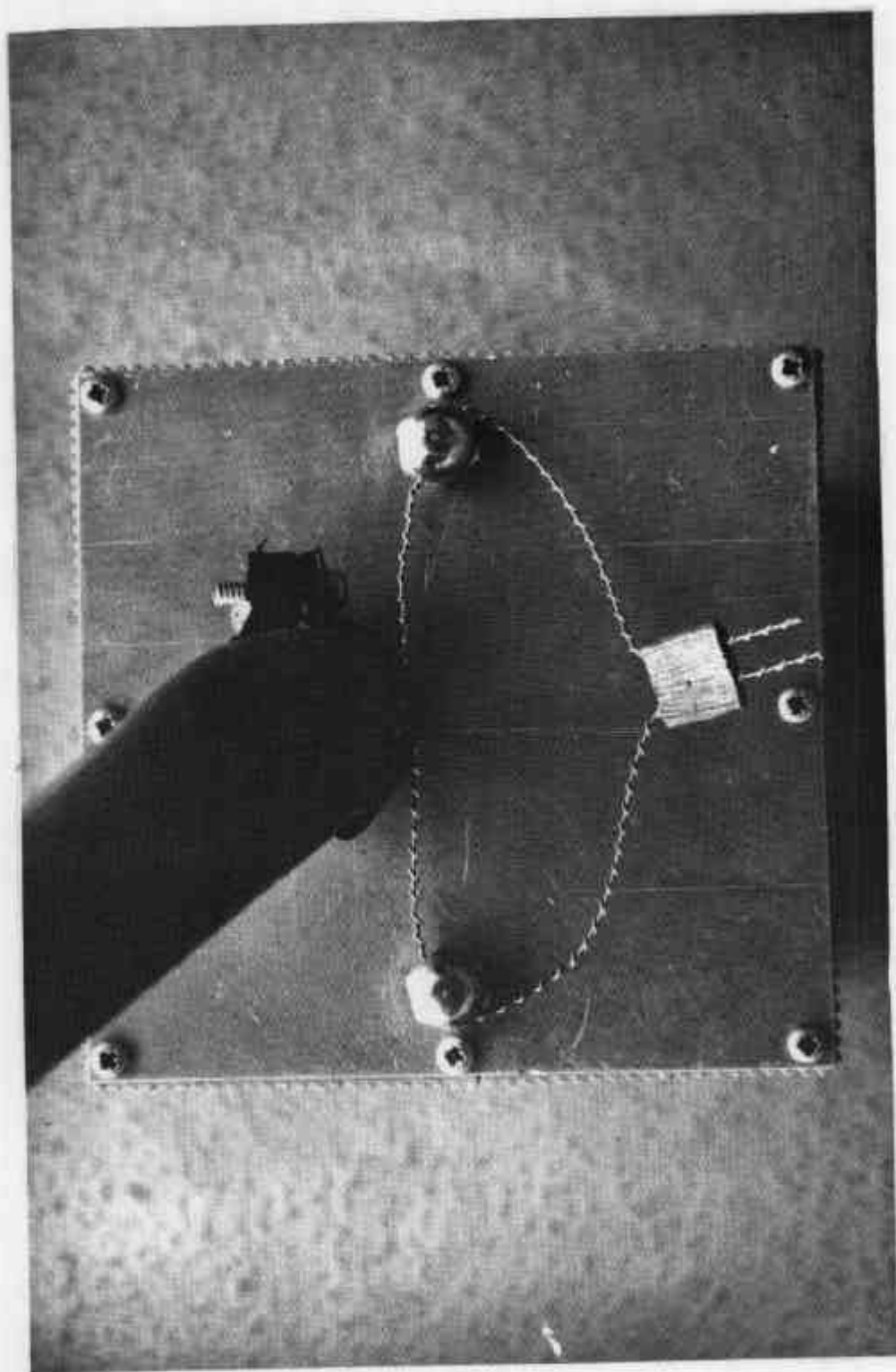
FIGURE 6/14D/9 - 7



Computer Unit — Sealing of Cover

(The sealing wire should be twisted and pass through the three sealing bolts in succession. Both ends of computer unit are sealed.)

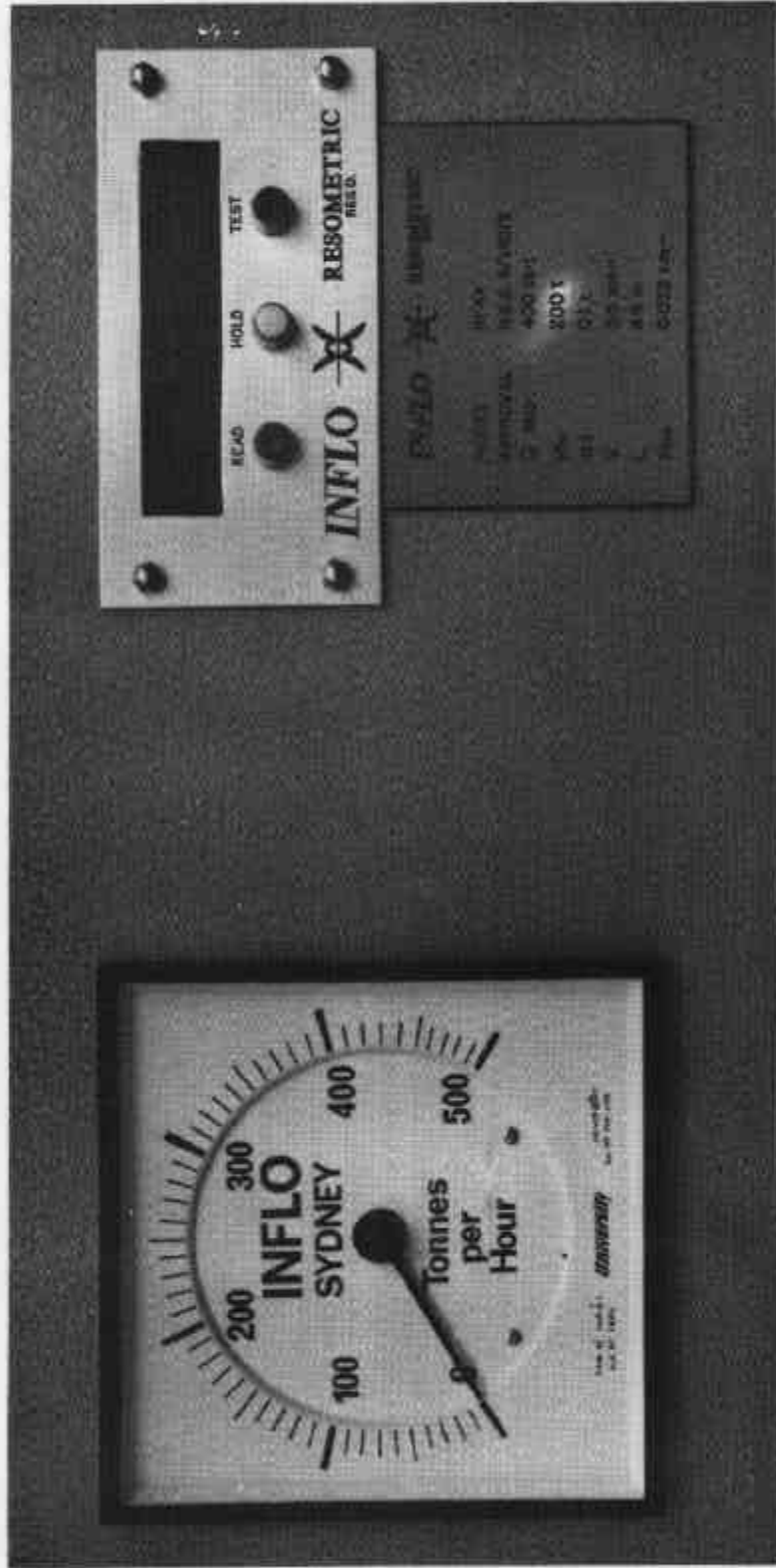
FIGURE 6/14D/9 - 8



Sealing of Cable to the Totalizer

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FIGURE 6/14D/9 - 9

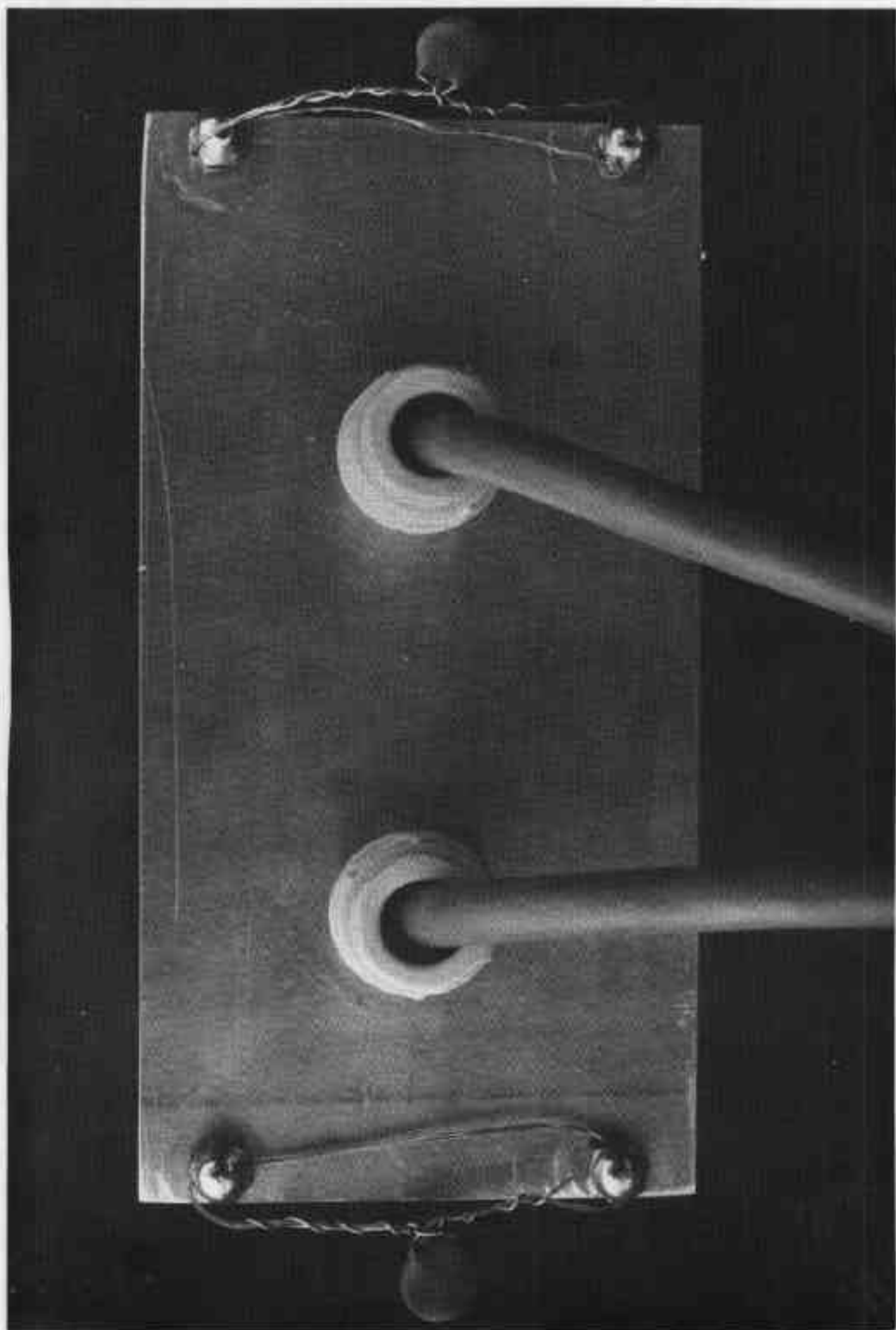


Inflo Electronic Totalizer

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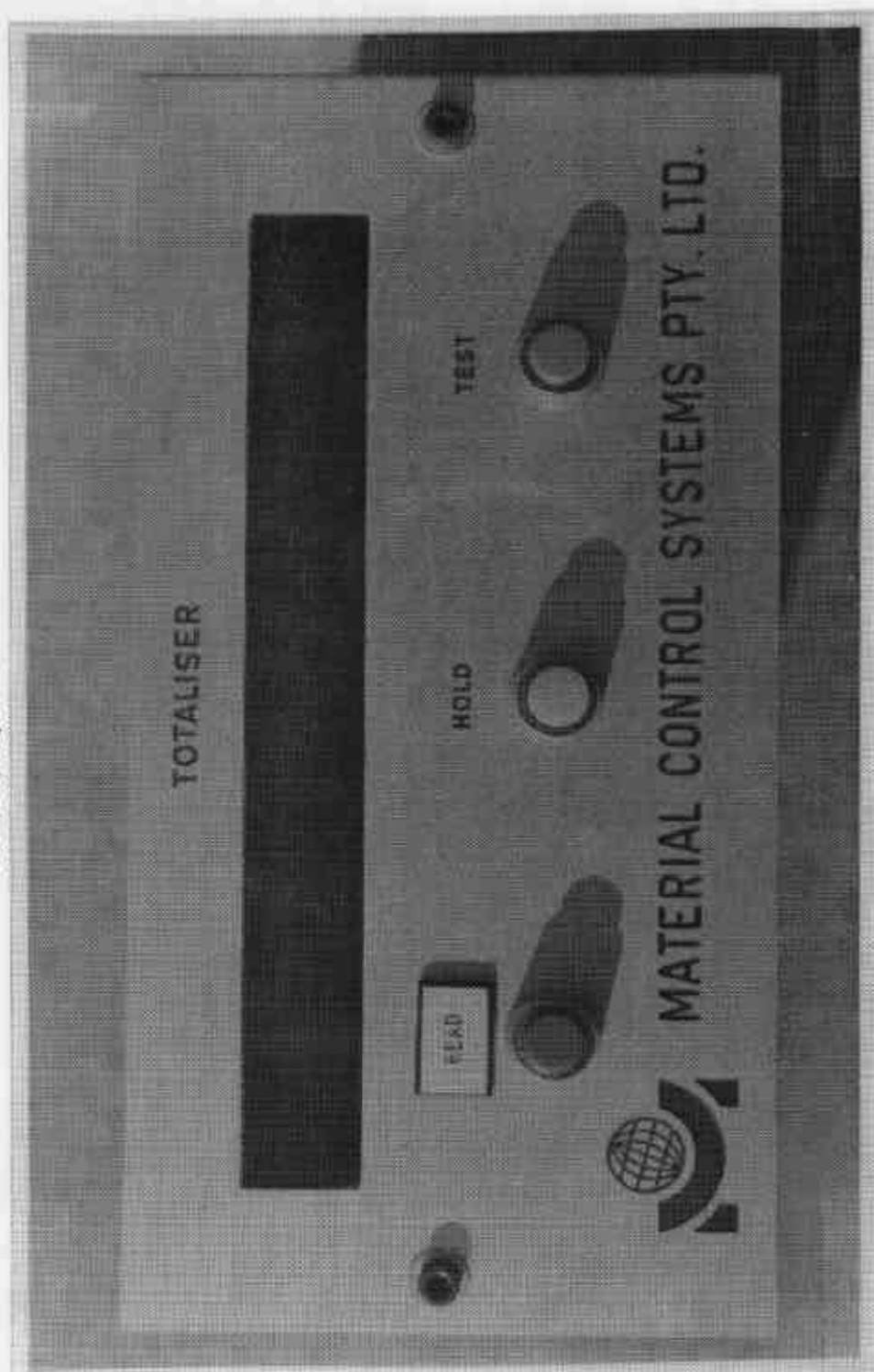
FIGURE 6/14D/9 - 10



Sealing of Cover on Electronic Totalizer

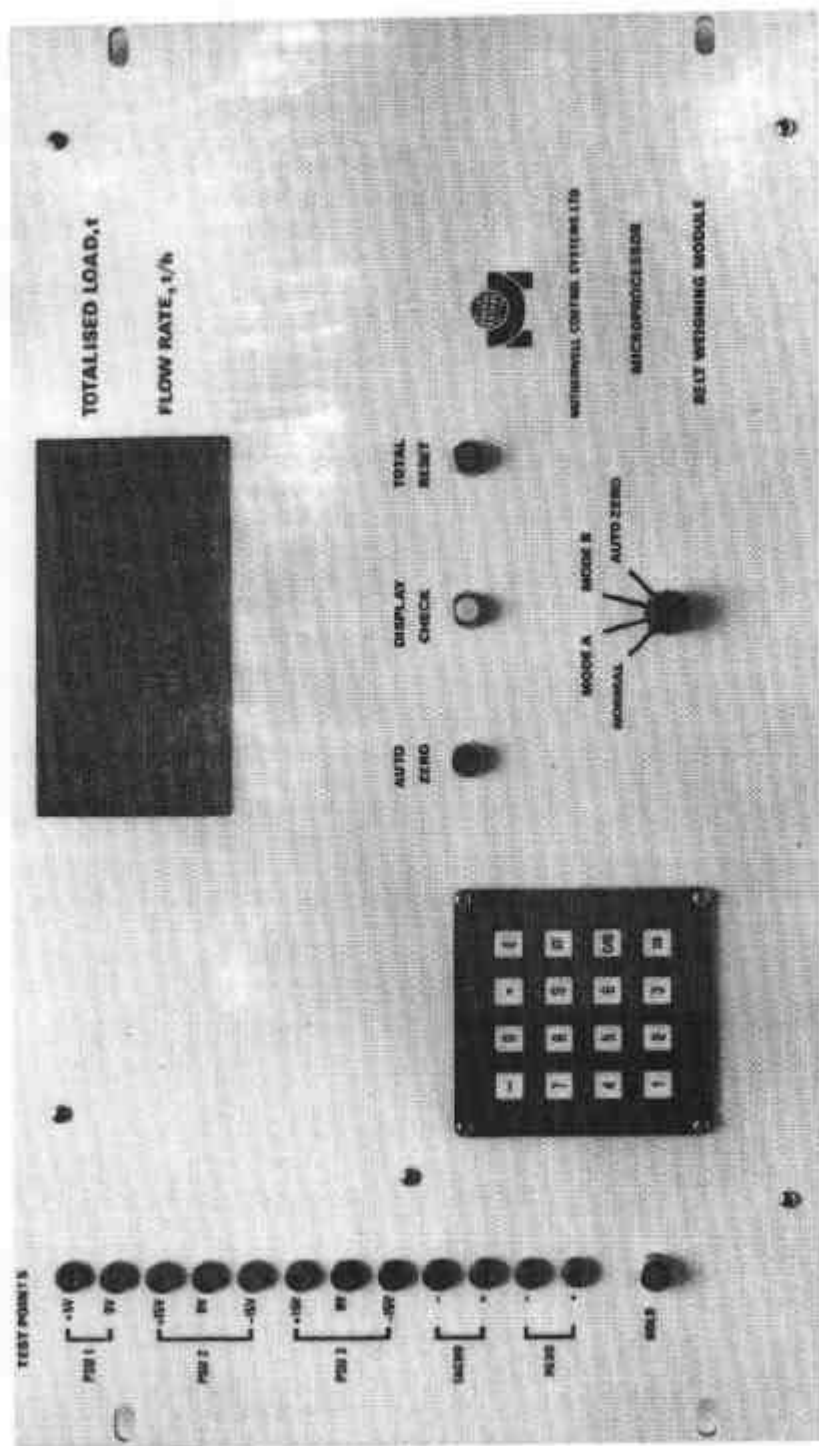
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FIGURE 6/140/9 - 11



Indicator Of Non-resettable Totaliser

FIGURE 6/140/9 - 12



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Front Panel Of MCS 9600 Logic Unit